nian one may expect to find remains of the Pine family in older formations. When therefore we get from the Silurians fragments of leaves of *Cordaites* (a probable discovery, for they have been found abundant in the Devonian) we shall have all the essential types of the plants of the Carboniferous flora already represented in the oldest paleozoic times.

A Species of Fungus recently discovered in the shales of the Darlington Coal Bed (Lower Productive Coal Measures, Alleghany River Series) at Cannelton, in Beaver County, Pennsylvania.

By Leo Lesquereux.

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The discovery of a *Fungus* in connection with plants of the coal measures is not less remarkable than that of land plants in the Silurian.

Lindley and Hutton, in their Fossil Flora of England, 1831-33, have represented (plate 65 of the first volume) a kidney shaped, round, flattened body, whose outline and surface, marked by zones of alternate density and coloring along the borders, recall somewhat the characters of some of the hard *Fungi* seen upon old trunks of the forests at the present time and known as *Polypores, Bolets,* etc., or generally called *Sponge-Mushrooms.* The characters of this fossil organism are so uncertain that the authors themselves, though applying to it the Generic name of *Polyporites,* consider as very doubtful its reference to the vegetable kingdom.

Mr. Bowman, the discoverer to whom the species is dedicated as *P. Bowmanni,* remarks, that one of his specimens might be taken for the scale of a fish or of some great Saurian. Since that time no kind of remains referable to *Fungi* has been seen in the coal, except one specimen found in the Anthracite measures near Pottsville, Pa. It is apparently identical with the English species and does not afford any more light upon its nature. This specimen, however, contradicts by its habitat its reference to the animal kingdom, as no remains of this kind are found in the Anthracite measures of Pennsylvania.

But there are in the Tertiary Lignitic of the Rocky Mountains some clay beds associated with coal, wherein are intercallated shaly fragments, colored

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have, at our epoch, globular or button-like stems impressed with cicatrices of leaves, and sometimes flattened and depressed at the top toward the central axis, where the tuft of leaves is coming out. If, therefore, such analogy could be admitted, these specimens would confirm the opinion advanced in considering the probable reference of the branches inscribed above. But this suggestion is too hazardous in its application to remains found in connection with Silurian limestone. For after all, these remarkable fragments may altogether represent one of those organisms like *Uphantænia, Dictyophytum,* etc., whose nature seems to partake of the character of land and marine vegetables, and whose relation is still unknown.

in concentric zones by penetration of iron in such a way that they exactly represent the appearance of the fossils described by the English authors. The zones, about two millimeters wide, are of different hardness, and the soft white ones being more easily disintegrated, they form a series of alternately elevated and depressed concentric bands, similar to those described as characters of the *Polyporites* of the coal.

However this may be, we have now from the Carboniferous a fossil plant which is by all its characters positively referable to the *Fungi*. This plant which was discovered under the bark of a *Sigillaria* is referable to the Genus *Rhizomorpha*, a fungose substance which even until the present time has very rarely been recognized with organs of fructification, and is therefore admitted as a kind of *mycelium* or as the first stage of the life of a *fungus*. Species of various and numerous forms of these vegetable organs are commonly found under the bark of trees or between layers of decaying wood in the forests, and some have been described under different specific names.

RHIZOMORPHA SIGILLARIÆ, sp. nov.

Pl. I, fig. 9.

Stem flattened irregular in form, round, polygonal, elongated and linear or amorphous; branches diverging all around, either simple or forking, even anastomosing in various directions, inflated towards the top, club shaped and obtuse or slightly flattened by compression, and marked upon the surface by a netting of narrow wrinkles resembling veins and their divisions in veinlets.

The figure exactly represents the specimen which botanists will easily recognize as bearing the appearance of some of our present so-called species of *Rhizomorpha*. The surface wrinkles, distinctly seen in fig. 9 b enlarged, seem to have been produced by compression and contact of an upper layer of bark reposing upon them. In their normal state the same appearance is remarked upon living forms of these *Fungi*. It is the same with the flattened body, the mode of branching, the different size and length of the branches, which are evidently widened and modified in their form and directions according to the space left under the bark for their development.

Though no doubt could be entertained about the relation of this organism, which was discovered in detaching the upper layer of bark of a *Sigillaria*, I nevertheless referred the matter to the opinion of some of my corresponding friends, to whom I sent the figure of the plant in order to have every possible evidence on this subject. Among others Dr. Casimir Roumeguére of Toulouse, France, who has large collections of *Fungi* and who is known by numerous scientific memoirs on this difficult branch of botany, answered my request by the communication of many specimens of the different forms of *Rhizomorpha* of our time whose characters are comparable to those of the fossil one. Remarking on its relation as far as it could be recognized from the figure of this organism (the same as that reproduced here) he says: I was extremely interested by the examination of your *Rhizomorpha Sigillariæ* and startled by the appearance of structure which seems to relate that American fossil organism to European con-

geners ; I have especially examined, in comparison, the described forms of *Rhizomorpha subcorticalis*, where I find characters which have removed my first hesitation in regard to your views. One of these forms, the *teredo* of Persoon, has few ramifications, nerves anastomosing, and the primary branches are flattened, enlarged and rugose as in the fossil specimen from Cannelton. The form *latissima* described by Kick, in the flora of Flanders from under the bark of *Betula alba*, has a flattened body resulting from the impression or cohesion of some stems, etc.

From the specimens communicated to me, most of the forms of *R. subcorticalis* present the mode of anatomosis in abnormal direction, as seen at the base of the branch c. Others have a flattened stem when unfolding under some closely pressed piece of bark ; but the branches generally take their cylindrical form when they come to more space especially where air is accessible. Though it is always difficult to find the top of the branches they are generally inflated or club-shaped as in the fossil specimen.

Dr. Roumeguére adds to the dry specimen a figure of *R. subcorticalis*, which represents a stem flattened and enlarged, as is the body of our fossil, with branches bearing at the surface small tubercles composing a false *peridium*, one of which, more advanced into maturity, has produced a club shaped body identically similar to those of *Hilaria digitata*, an autonome *Fungus*. This production has been as yet very rarely observed. Except that the ramifications of the branches of that living species are longer and not inflated at the top, which is not discernible in the specimen, the fossil form is remarkably similar to it.

I received also from Professor C. H. Peek, of Albany, some specimens of *Rhizomorpha* more or less representing the character of *R. Sigillariæ*.

No fossil plant published until now from any of the geological formations of Europe or of America has any relation to this. In Sternberg, Vers., *Aphlebia tenuiloba*, represented in Vol. II, pl. lviii, fig. 2, might be quoted as bearing some relations to the plant of Cannelton by its branches irregularly diverging from an enlarged amorphous central nucleus. But though this species, a mere variation of *A. adnascens*, Pr., represents a parasite plant, it has, like the others described under this generic name, a distinct system of nervation, according to which, the divisions of the primary stems are in an outside or upward direction, and therefore do not, and cannot anatomose either in right angle or in abnormal direction, as is the case with plants of cellular tissue. Thus we would have only for comparison, outside of the *Fungi*, marine plants or Fucoids, and of course the presence of marine plants in connection with *Sigillaria*, even under the bark of trees of this kind, is an impossibility.

Habitat. I found this vegetable organism in shaly cannel or cannel shale of the Cannelton coal, of Beaver County, in company with the proprietor, Mr. I. F. Mansfield, who in pursuing systematic researches for fossil remains has obtained a remarkably rich series of rare and new species of plants of the Carboniferous. The character of a rib of Sigillaria is easily recognized upon the figure of the specimen, which bears also one round scar of the under surface. The upper layer of bark transformed into coal was broken in small fragments to fully expose the fossil *Fungus*.